

AGRICULTURE

Project Fact Sheet



COMPLETING PRE-PILOT TASKS TO SCALE UP BIOMASS FRACTIONATION PRETREATMENT APPARATUS FROM BATCH TO CONTINUOUS PROCESS

**PRODUCING A PURIFIED CELLULOSE STREAM IS A
CRITICAL STEP TO ACHIEVING ECONOMICAL CONVERSION
OF BIOMASS INTO ENERGY AND INDUSTRIAL PRODUCTS**

Benefits

PureVision biorefineries will:

- Use agricultural and forest wastes to produce sugars, ethanol, energy and many industrial chemicals
- Offer industry wide saving of 2.3 trillion BTU by 2010
- Minimize fossil fuel inputs by using carbon-neutral processing and producing bio-products

Applications

Biomass conversion has widespread applications and will be beneficial to many industries interested in renewable energy resource management including:

- Agriculture
- Forest products
- Food processors
- Land managers
- Solid waste management
- Specialty chemical manufacturers
- Blenders and marketers of fuel ethanol

A biomass conversion technology has been developed that separates ligno-cellulosic materials into product streams for economical processing into energy and industrial products. PureVision Technology, Inc. has built an operating, bench-scale, biomass-processing apparatus and is currently evaluating the conversion of corn stover into resources. This apparatus has produced a purified cellulose stream with greater than 97% purity. Producing a purified cellulose product is a critical step in achieving economical conversion of biomass into sugars utilizing enzymatic hydrolysis.

A continuous pilot-scale machine will provide the engineering criteria for designing a commercial demonstration biorefinery and will provide the basis for performing formal processing and economic assessments of converting diverse biomass feedstocks into resources at commercial biorefineries. The successful implementation of the PureVision reactive fractionation biomass pretreatment technology would result in the economical processing of biomass into resources, thereby enhancing national productivity and global competitiveness while minimizing adverse environmental impacts.

PUREVISION BIOREFINERY SCHEMATIC

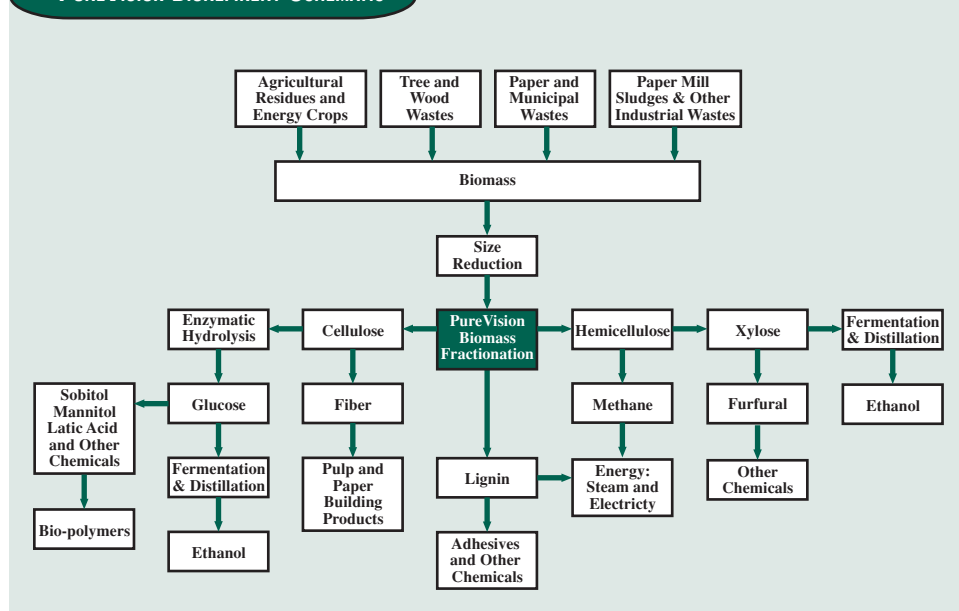


Illustration of the PureVision Biomass process.



Project Description

Goal: The goal of this project is to develop the costing and design criteria to build a one ton per day pretreatment pilot plant. This research is to determine the necessary elements, procedures and costs in retrofitting off-the-shelf plastic extrusion equipment into biomass processing and conversion equipment. PureVision expects to demonstrate the ability to process corn stover into three fractions. The first fraction is a wash liquor stream containing primarily water and hemi-sugars. The second fraction is a wash liquor stream containing primarily water and lignin. The third fraction is a purified cellulose product stream. The continuous process is to be the heart of PureVision's biorefineries of the future.

Progress and Milestones

The following are the main tasks to be performed:

- Operate and collect data on a continuous biomass processing apparatus to process corn stover into three fractions.
- Run samples and collect data on a liquid-separation and purification apparatus from the hemi-sugar-rich wash liquor stream and the lignin-rich wash liquor stream generated from the processing wash stream fractions.
- Perform enzymatic hydrolysis tests and corresponding assays on the purified cellulose product being generated from the biomass process.
- Complete preliminary design and costing for assembling and shaking down the proposed pretreatment pilot plant.

Growing market for bio-fuels and bio-products: Once the cellulose, hemicellulose and the lignin fractions are separated in the PureVision biomass-fractionation process, they become feedstocks for producing sugars, fiber, energy and chemicals. Glucose, xylose and other sugars produced in biorefineries can be manufactured into xylitol, mannitol, furfural, bio-plastics and other industrial chemicals. The market for these fermentation sugars is estimated to be 20 to 50 million tons per year for fuel ethanol production and 100 million tons for production of chemicals and plastics.

A key strategy for utilizing PureVision's technology is to produce fuel ethanol to supplement gasoline. In addition to significant environmental benefits, domestically produced ethanol will reduce the United States dependency on foreign oil. In 2001, approximately 1.8 billion gallons of ethanol representing \$2.7 billion in sales was produced from corn in the US. In the PureVision process, corn stover, which includes corn stalks and other corn residues, and other forest and wood wastes can be converted to sugars. The PureVision process can help the U.S. Department of Energy meet its target of producing 10 billion gallons of ethanol per year from all sources of biomass by 2020.

Economics and Commercial Potential

The proposed work will advance commercialization efforts by completing essential equipment evaluations for scaling up an invention currently undergoing testing that, to date, has proven to work only at batch processing. Commercial introduction of this technology is expected by 2005. Annual energy savings by 2010 would be 2.3 trillion Btu from one installation. By 2020 the savings would grow to 41 trillion Btu with 18 biorefineries using the technology.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

For project information, contact:

Ed Lehrburger

PureVision Technology, Inc.
511 N. McKinley Ave.
Ft. Lupton, CO 80621
Phone: (303) 857-4530
Fax: (303) 857-0323
Ed@Purevisiontechnology.com

Home Page:

www.purevisiontechnology.com

For more information about the Inventions and Innovation Program, contact:

Lisa Barnett

Program Manager
Inventions and Innovation Program
Phone: (202) 586-2212
Fax: (202) 586-7114
lisa.barnett@ee.doe.gov

Visit our home page at

www.oit.doe.gov

Office of Weatherization and Intergovernmental Program
Energy Efficiency and Renewable Energy
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585-0121



September 2002